ABSTRACT OF THE DISCLOSURE

The present invention provides a fatty acid lyase, wherein the activity of the lyase for 9-hydroperoxide substrates is greater than the activity for 13-hydroperoxide substrates and wherein K_m and V_{max} of the lyase for 9-hydroperoxylinolenic acid are greater than K_m and V_{max} of the lyase for 9-hydroperoxylinoleic acid. More particularly, the invention provides a lyase present in *melon* (*Cucumis melo*). The invention also provides a nucleic acid encoding the lyase, vectors, and expression systems with which the recombinant lyase can be obtained. The invention also provides methods of using the lyase of the invention, including methods of cleaving 9-hydroperoxylinoleic acid, 9-hydroperoxylinolenic acid, 13-hydroperoxylinoleic acid, and 13-hydroperoxylinolenic acid. Also, the invention provides a method of preparing 3-(Z)-nonenal, (3Z,6Z)-nonadienal, 2-(E)-nonenal, (2E,6Z)-nonadienal, or their corresponding alcohols and a method of preparing n-hexanal, 3-(Z)-hexen-1-al, 2-(E)-hexen-1-al, or their corresponding alcohols using the lyase of the present invention.